Ham-Homebrew Digest   Sun, 19 Sep 93   Volume 93 : Issue   48

Today's Topics:
                  Anyone interested in discussing PLL synt
         Anyone interested in discussing PLL synthesis? (3 msgs)
                          Dany Stevig's kits
                   Project 7: 15 watts on 80 and 40*
                         Rick Campbell's R2/T2

We trust that readers are intelligent enough to realize that all text
herein consists of personal comments and does not represent the official
policies or positions of any party. Your mileage may vary. So there.

Date: 17 Sep 1993 16:29:36 GMT
From: dog.ee.lbl.gov!agate!spool.mu.edu!olivea!koriel!newscast.West.Sun.COM!
sunspot!myers@network.ucsd.edu
Subject: Anyone interested in discussing PLL synt
To: ham-homebrew@ucsd.edu

In article 4gc@news.acns.nwu.edu, rdewan@merle.acns.nwu.edu (Rajiv Dewan) writes:

>My experience (if one can call it that) is minimal. I have designed a
>few on paper using Mot chips but never tried them out. :) So they may
>be worthless...

The Motorola chips are quite good. Furthermore, if you look at the spec
sheet for the MC4044 ECL Phase Comparator, an excellent discussion of
side-band suppression is there.

I'll admit I have not used the formal PLL texts extensively; I plan
to rectify this in the near future.

I built a 9MHz synth for a transceiver that implments IF shift. I use
an MC145157P-1 (now superceded by the essentially identical MC145157P-2)
driving an op-amp low-pass filter. The VCO is a JFET Hartley circuit.
The output range of the synth is 8.990- 9.010 Mhz. I tune the synth by
changing both the reference divider and loop divider values. I constrained
the ranges of these values in order to not compromise the loop filter too
much.

The application, as a carrier oscillator, requires good close-in spectral
purity. However, since the carrier oscillator is used to create a DSB
signal that is then filtered in an SSB filter, sensitivity to side-bands
may not be too important as long as the sidebands are far enough away from
the SSB filter response. I use a range of reference frequency from 8KHz to
12Khz in the current design, putting the closest sideband about 5.6KHz above
the high end of the filter response. I selected a loop filter response
such that the 1st sidebands are about -60dBc; this, combined with the
steep skirt on the filter, should give at least 90dB of suppression to
the undesired response (which is something like inverted audio).

Of course, one trades off loop response time for side-band suppression.
Without using an adaptive loop filter, one can still have fairly fast
lock-up times in a PLL if you don't mind strong sidebands every Fref
interval above and below the carrier. In this case, the loop filter
may permit the PLL to also suppress close-in phase noise in the VCO.

You can get very good sideband suppression, but this comes at the expense
of greatly increased lock-up time and the PLL will not be able to suppress
close-in phase noise in the VCO; in this case, you'll need to use a very
clean i(high-Q) VCO to start with. A good compromise is to use an adaptive
loop filter; the loop filter frequency response is greatly increased when
an out-of-lock condition is detected. However, be careful not to let the loop
become unstable (Actually, if the loop locks, even briefly, the adaptive
filter would then go to normal operation, so it may not be critical to have
adequate damping when the loop is adapting).

I built my VCO in a copper clad box for the prototype. I used a T-50-2
toroid for the inductor. The circuit was quite microphonic until I squirted
a glop of hot-melt on the toroid; wax might be a better choice since it
is easier to remove. Also, the VCO is extremely sensitive to capacitive
coupling, like a theremin. Shielding the VCO in all directions cures this.
Once the loop is closed and the VCO locked, it tracks out drift quite effectively.
My VCO uses a pair of 2N3904 NPN transistors in a broadband buffer configuration,
but you can do almost anything you want to buffer the VCO.

If you decide to build a VCO on a PC board, be certain to include provisions
to shield the VCO in all directions, meaning you need to solder a shield
under the PC board, around the VCO, and on top of the VCO shield. [The Ramsey

VHF/UHF radios use a PLL that, I'm told, is not adequately shielded. This
usually results in the VCO coupling to almost anything, which makes the PLL
try to track it out, which tends to increase the sideband level. Moral is:
Be sure to adequately shield your Ramsey VCO if you build or have built one
of the kits.]

I don't feel like drawing ASCII art, but, if you are interested, I can
FAX you a hand-drawn schematic of the prototype circuit. Eventually
I hope to have a post-script representation.

---
 * Dana H. Myers KK6JQ, DoD 466 | Views expressed here are
     *
 * (310) 348-6043 | mine and do not necessarily   *
 * Myers@Cypress.West.Sun.Com | reflect those of my employer
     *
 * This Extra supports the abolition of the 13 and 20 WPM tests *

Date: 19 Sep 93 01:18:56 GMT
From: pipex!sunic!news.funet.fi!funic!nntp.hut.fi!nntp.hut.fi!
Tomi.Manninen@uunet.uu.net
Subject: Anyone interested in discussing PLL synthesis?
To: ham-homebrew@ucsd.edu

In article <27cilr$mkc@newscast.West.Sun.COM>
myers@cypress.West.Sun.COM (Dana Myers) writes:

>I've built some PLL synthesizers and learned quite a bit in doing so.
>Is anyone interested in starting a thread about constructing PLL
>synthesizers for HF and above?

Well, for starters you could answer to one question for me. That is:
Is there a problem using a dual modulus prescaler intended for use
with synthesizers with negative edge triggered internal counters in
front of a PLL synthesizer chip with positive edge triggered internal
counters? In short form: can I use a MC145152 and a MC12022B together
without any special measures?

In the spec sheet of MC145152 it says that the output of the prescaler
should go from low to high after each P or P+1 input cycles (or was it
the other way around, can't remember right now). And the spec sheet of
MC12022 says that one should use a MC12022A with MC145xxx series
synthesizers.

As you could guess my system is above HF. VCO is abt 412 MHz and
prescaler 64/65. Reference frequency is 12,5 or 25 kHz (we'll see... :-)

--
---Tomi Manninen   /   Tomi.Manninen@hut.fi   /   OH2BNS @ OH2RBI.FIN.EU---

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Date: 17 Sep 1993 14:47:23 GMT
From: dog.ee.lbl.gov!agate!spool.mu.edu!olivea!koriel!newscast.West.Sun.COM!
sunspot!myers@network.ucsd.edu
Subject: Anyone interested in discussing PLL synthesis?
To: ham-homebrew@ucsd.edu

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Is anyone interested in starting a thread about constructing PLL
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Dana

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     *
 * This Extra supports the abolition of the 13 and 20 WPM tests *

Date: 17 Sep 1993 10:18:17 -0600
From: orca.es.com!cnn.sim.es.com!moons.sim.es.com!not-for-mail@uunet.uu.net
Subject: Anyone interested in discussing PLL synthesis?
To: ham-homebrew@ucsd.edu

Why not? It is probably as important a topic as getting < 1W RF at the
antenna. After all, if the 1W is out of band, it could be bad for you.

--
Douglas L. Datwyler, WR7O
Evans & Sutherland Computer Corp.
preferred e-mail: datwyler@moons.sim.es.com

Date: Sat, 18 Sep 1993 22:43:41 GMT
From: library.ucla.edu!agate!howland.reston.ans.net!newsserver.jvnc.net!
newsserver.egr.uri.edu!orca!swamik@network.ucsd.edu
Subject: Dany Stevig's kits

To: ham-homebrew@ucsd.edu

Hi
     I have heard alot about someone named Danny Stevig who sells kits.
 Has anyone had any experience ordering from this guy? Anyone have a
 list of kits and prices available? Please reply to my e-mail addr.

tnx es 73 de KB1AMB/AE

swamik@orca.ele.uri.edu

Date: Fri, 17 Sep 1993 02:26:13 GMT
From: news.Hawaii.Edu!uhunix.uhcc.Hawaii.Edu!jherman@ames.arpa
Subject: Project 7: 15 watts on 80 and 40*
To: ham-homebrew@ucsd.edu

* If you are reading this on the rec.radio..homebrew newsgroup feel free
to run the full 15 watts. BUT, if you are reading this on the QRP mailgroup
you can only use this xmtr in the standby mode (a few milliwatts)(no fair
cheating now...).

   Here's the most sophisticated xmtr project so far: 15 watts output on 40
and 80 meters. There is a standby mode which keeps the oscillator ticking
but cuts out the PA transistors - use this for zero-beating your rcvr to
the xmtr output frequency (uh, I guess this really isn't necessary with
today's receivers... This IS an old book).
   The book is 104 HAM RADIO PROJECTS FOR NOVICE AND TECHNICIAN, by
Burt Simon, 1968.
   Burt says:
  "RFC1 should be a low resistance; use a 1/4 inch loopstick and at least
20 turns of #28 wire or larger. No component values are critical except for
the amplifier coils. The NE-2 bulb should be mounted flat against the
chassis near the #49 bulb with both leads connected to the antenna lead
and only stray capacitance to ground. Also be sure to use a fundamental-
frequency crystal. The oscillator transistor does not need a heat sink,
although you'll need a Wakefield #NF207 on the buffer transistor.
   "Tuning: Only final amplifier adjustments are necessary. Tune always
for maximum output, NOT MINIMUM PA CURRENT. Normal tuning of C9 and C10
should bring about a satisfactory bulb brilliance. If antennas are under
30 feet (or 1/2 wave), output capacitance will be much less and tuning
capacitance more; the #49 bulb will show less current, but the neon bulb
will ignite showing high voltage feed. In general, tune for maximum
bulb brilliance regardless of load."

Parts List:

```
Q1,2    2N697 transistor; use Wakefield #NF207 heat sink on Q2
Q3,4    PADT50
C1,4,12 330 pF capacitor
C2      .068 mF
C3,5    .01 mF
C6,8    .22 mF electrolytic, 50V
C7      820 pF
C9,10   365 pF variable
C11     330 pF
R1      27K resistor
R2      3.3K
R3      330 ohms
R4      10K
R5      100 ohms 2W
R6      1.5 ohms 2W
```

```
                          --------------------------------->12-28VDC
                          |
                          |
                          |        ------------------>12VDC (for zero beating)
                          |        |
                          |    R *
------------*------------*----*--- SW1A
|           |           |    |T *
|           |           |    |  |
R1         RFC1         C5   |  *----*----*----*----
|           |           |    |  |    |    |    |    |
|           |          GND   |  |    |    |    |    |
*---X1------*---C4----        |  C6  RFC3 C8   R6   I3
|           |         |       |  |    |    |    |    |
|           |    *-B-Q2-C--   |  |    *----*---*
*--B-Q1-C----    |  E     GND |  |    |       |
|   E           R4 |          |  E       E
|   |            | *-----C7-----*   Q3-C--C-Q4
*-C1-*----       | |          |  B       B
|  |  |          | R5         |  |       |
R2 R3 C3         | |          *----*---------          ANT
|  |  |        ----*          |                         |
|  |  |          |            |   ------>RCVR ANT        |
*----*---*-----RFC2-------    |   |                   ----I1----*
|  |                          |   |R                   |        |
|  |                          |   *  SW1B              |        |
C2    ----KEY---GND           |   -----*--L1--*--*--L2--*--*--L3--*
|                           -----*T   |    | |    | |    |
|                                |     |    | |    | |    |
```
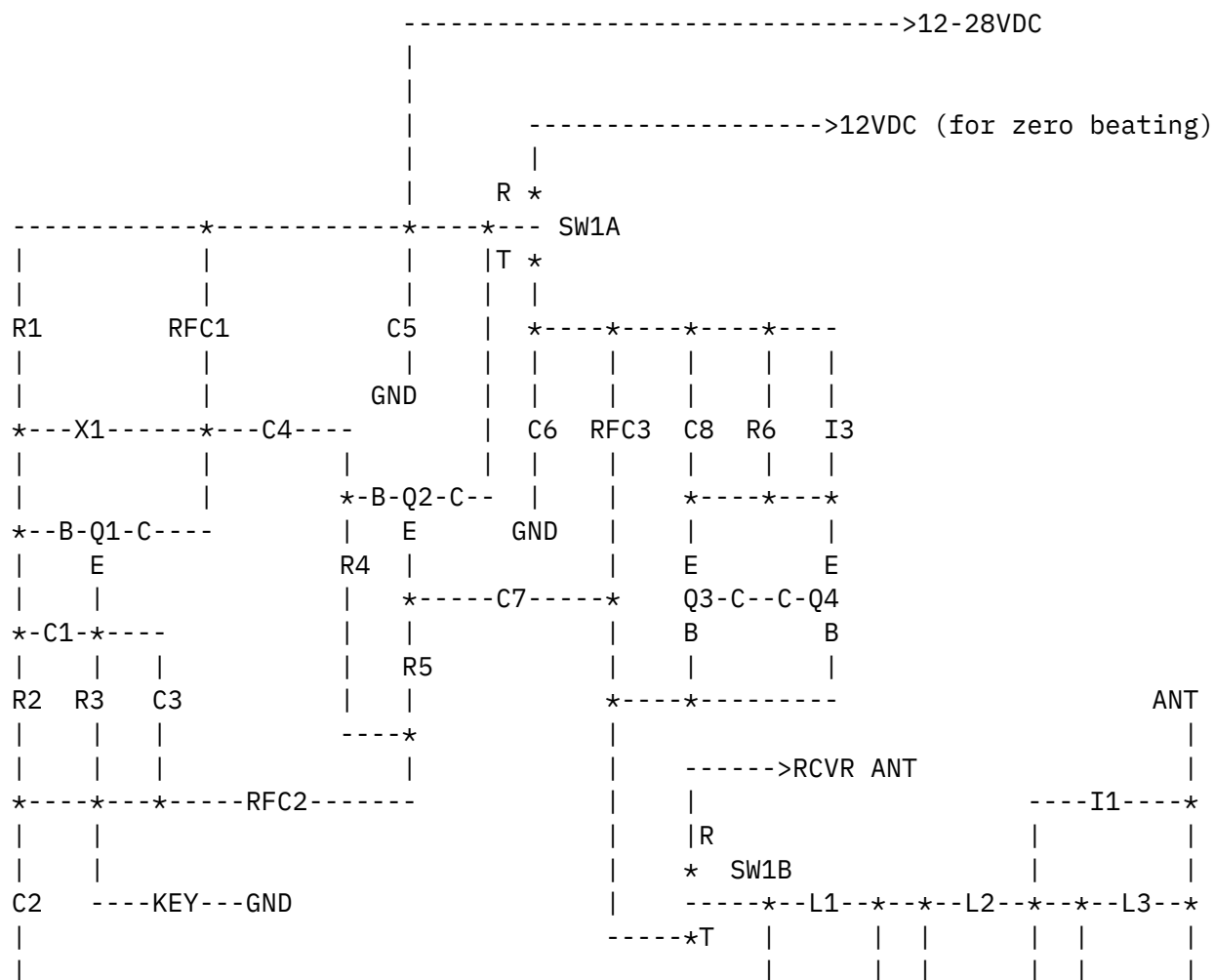
```
GND                                    RFC4      | C11   C10 |        I2
                                          |       |   |   LOAD |        |
                                          |      C9   |       |  C12    |
                                       GND   TUNE |      GND    |      GND
                                          |   |               |
                                       GND   |               |
                                          80*|*40     LO*|*HI
                                             |           |
                                       SW2 *           * SW3
                                             |           |
                                             |           |
                                            GND         GND
```
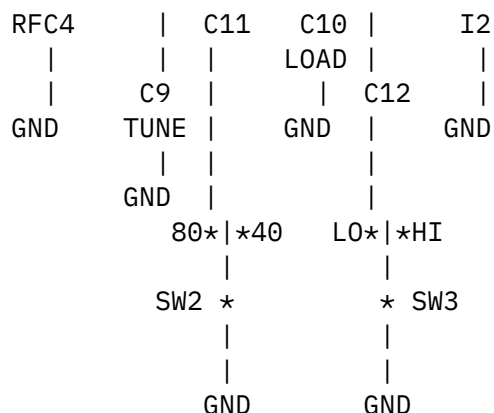
Whew! Okay, note that the 40M terminal of SW2 is not connected to anything;
neither is the HI terminal of SW3. As I written, C9 is the tuning and C10
is the loading capacitor.

Jeff NH6IL

Date: Sun, 19 Sep 1993 03:23:28 GMT
From: library.ucla.edu!agate!tcsi.tcs.com!iat.holonet.net!
rohrwerk@network.ucsd.edu
Subject: Rick Campbell's R2/T2
To: ham-homebrew@ucsd.edu

was fascinated with those articles in QST in the last year about direct
conversion, single signal receivers and a companion phasing SSB exciter,
all realized with modern technology. Anybody built these? And did anybody
ever get a kit from Rick? I'm a bit fearful of the prospect of closely
matching those fixed inductors without any good test equipment!

John K0JD

End of Ham-Homebrew Digest V93 #48
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